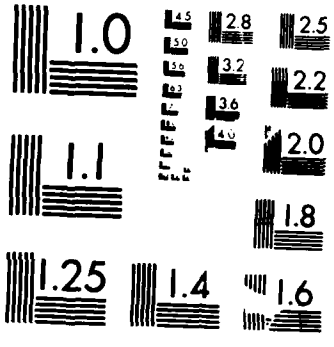
AD-A187 424 REPORT OF TEST ON GEARBOX WESTECH GEAR CORP MODEL 1321 1/1
PRODUCTION TEST(U) WESTECH GEAR CORP LYNWOOD CA
R A HUDSON ET AL 03 JUL 85 1109492 DAAK70-84-C-0113
UNCLASSIFIED F/G 13/9 NL



WESTECH GEAR CORPORATION
Formerly the Power Transmission Division of Western Gear Corporation
POST OFFICE BOX [illegible] ● [illegible] EAST IMPERIAL HIGHWAY ● [illegible] CALIFORNIA [illegible] ● PHONE [illegible]

Originator's
Report No. 1109492

Revision

REPORT OF TEST ON Gearbox
WesTech Gear Corp. Model 1321
Production Test

TEST PERFORMED BY:

R. A. Hudson

TEST AUTHORIZED BY:

M. W. Neesley

U.S. Army Belvoir R & D Center
Purchase Order DAAK70-84-C-0113

	Date	Signature
Test Initiated	06-21-85	
Test Completed	06-22-85	
Report Written		
Test Engineer	7-5-85	R A Hudson
Supervisor		
Final Release		

TEST REPORT NO. 1109492

DATE: July 3, 1985

1.0 Purpose of Test

To determine the proper assembly and general running performance of the test unit, a Model 1321 Speed Increaser, provided under Contract DAAK70-84-C-0113 for the US Army Belvoir Research & Development Center.

2.0 Test Equipment

2.1 Driver. The 1600 hp Commercial Test Dynomometer, driving through a speed increaser, was used to drive the test unit.

2.2 Coupling. A 2.00 Diameter jackshaft with a special test hub mounted on one end coupled the dynomometer slave unit to the test unit. The special hub has the same mounting dimensions as the flywheel of the intended driver of the test unit and mates with the outer ring of the Vulkan coupling provided with the test unit.

2.3 Covers. The flanges interfacing with test unit driven equipment, sealed by installation of these devices, were covered.
One AC generator flange by plywood, one AC generator flange by plexiglas, and the cooling pump flange by plexiglas. The DC generator flange has an oil seal and was open for examination.

2.4 Lubrication. The test unit lubrication system was completed by the test stand which provided a 25 micron filter, a water-to-oil heat exhanger, a pressure relief valve, and interconnecting hose. The lubricating oil was circulated by the test unit shaft-driven pump.

2.5 Instrumentation.

2.5.1 Vibration. The housing vibration was determined by transducers mounted axially, vertically and horizonatally (transverse).

2.5.2 Temperature. Type J (iron-constantan) thermocouples were installed in the lubrication oil line before and after the heat exchanger, and a similar thermocouple was installed under a bolt head on the DC generator flange.

2.5.3 Pressure. A Bourdon tube pressure gauge was installed at the oil inlet to the test unit.

3.0 Test Set-up.

3.1 The Vulkan coupling was bolted to the special adapter keyed to the jackshaft, and the assembly coupled to the slave gear. The test unit was then plugged into the splined hub of the Vulkan coupling.

3.2 The test unit was set on a rigid foundation and secured by tie-downs holding the mounting flange at the bottom of the unit. (See sketch in the Test Information Sheet, included as Exhibit I.) Additionally, a brace between the input flange of the test unit and

A-1

the slave unit, simulating the intended driver, provided stability for the test run.

3.3 The test unit was aligned to the slave gear so that a dial indicator mounted on the special adapter showed less than .005 inches TIR when rotated against the input flange.

3.4 The test lubrication system hoses were installed at the pump discharge, unit oil inlet, and unit oil bypass connections. The pump suction line is part of the test unit assembly. (See pictures attached as Exhibit II.) The unit was filled to the correct operating level with 150 ssu at 100 Deg F oil having preservative properties.

3.5 Instrumentation was attached as specified.

3.6 The unit was turned by the dynomometer to check rotation.

4.0 Test Procedure.

4.1 Pre-test. The test set-up was examined prior to the test run. Of particular concern during this procedure was the equipment alignment, coupling balance, test unit mounting, oil level and test unit initial operation. The test was slowly brought up to full speed and instruments were continuously monitored. Any abnormal operation or reading was cause for shut-down and corrective action. This phase was concluded when effects of the test set-up on unit performance were minimized.

4.2 Test Run. The test equipment was brought up to 2700 rpm and run for two hours after the oil inlet temperature was stabilized at 180 Degrees F. Readings of unfiltered housing vibration, oil temperature, bearing housing temperature and oil pressure were recorded at half-hour intervals.

4.3 Disassembly. After the test run the unit was disassembled and inspected for indications of wear or heat.

4.4 Leak Test. After reassembly of the test unit and prior to final detail, the unit was mounted on the test stand, as before except without brace, and run at 2800 rpm input for 15 minutes after temperature stabilization at 180 Degrees F to check for oil leaks. Oil temperature and housing vibration were recorded.

5.0 Results of Test.

5.1 The coupling arrangement used in the test, made necessary by the test equipment, was unlike the intended installation of the test unit in that the input shaft supported most of the weight of the jackshaft coupling assembly. Much of the pre-test was spent field balancing this assembly to minimize its effect on the housing vibration which initially was as much as 5 mils transverse at 1500 rpm input. The brace between the test unit and the slave gear was decided on during the pretest to provide a more rigid mounting arrangement.

The pump suction port was improperly oriented at assembly and was corrected. Also, substantial leak from improperly tapped plugged holes was noted during the pre-test and corrected by assembly prior to the test run.

5.2 The recorded results of vibration, temperature and oil pressure are included as Exhibit III. Performance falls within acceptable limits in all areas. Though the transverse housing vibration exceeds the anticipated level of 1.0 to 1.25 mils, these levels recorded are ascribed to the influence of the test coupling arrangement. An area of concern prior to the test was performance of the DC geneator bearings and potential oil foaming due to the operating oil level in the unit. There was no indication that this will be a problem since the unit stabilized at temperature and no excessive vapor was observed at the vent. Foam seen at the plexiglas covered flanges remained a stable level and air entrapped in the oil was given up immediately upon unit shutdown. The oil seal at the DC generator was weeping oil due to the seal being assembled slightly crooked. Subjectively, the unit ran quietly with nothing unusual noted.

5.3 After disassembly, a brown residue and very light blueing was noted on both output side AC generator pinions. It was concluded that the pinion was spinning in the inner race of the bearings. This conclusion was born out when fits measured and found to be 0.0 to .0002 loose. As a necessary corrective action, but one not affecting unit performance, the ends of the pinions were plugged to expand the undersized diameter and ground to a .0005 tight fit. No other indications of abnormal operation were noted. The unit was reassembled, using sealant compatible with synthetic oils, and returned to the test stand.

5.4 During leak test, the unit performed without leaks and was released for shipment.

TEST INFORMATION SHEET
REV 5-18-85

CUSTOMER ARMY/ BELVOIR

S.O 180-91587 SHIP _____

QTY 1 MODEL _____ HP _____

INPUT RPM 2700 * TEETH _____

OUTPUT RPM _____ TEETH _____

UP MESH [ ] DOWN MESH [ ]

SHAFT ASSY DESIGNATION _____

HIGH SPEED SHAFT:

STRAIGHT [ ] TAPERED _____ IN/FT

DIA _____ KEY _____

LOW SPEED SHAFT:

STRAIGHT [ ] TAPERED _____ IN/FT

DIA _____ KEY _____

CENTER DIST _____ SHAFT HT _____

THRUST BRG TYPE _____

THRUST BRG LOCATION _____

LUBE SYSTEM _____

OIL PRESS 20 PSI FLOW _____

OIL INLET TEMP _____

BLEED OFF REQUIRED _____

SPARES _____

BRG LOSS DATA REQD YES[ ] NO[ ]

TEST TYPE SPECIAL SPIN, 2 HOURS

REQD TEST HP -0-

SPECS _____

CUST WITNESS YES [ ] NO [X]

DISASSY INSP REQD YES [ ] NO [X]

SLOW ROLL LIMITS:

HS _____ LS _____ AXIAL _____

PHOTOS REQD YES [ ] NO [ ]

TEST VIBRATION LIMITS:

HS _____ LS _____ AXIAL _____

VIB PROBES JOB [ ] SHOP [ ]

TYPE _____

LOCATION _____

CALIB DATA REQD YES[ ] NO[ ]

TEMP PROBES JOB [ ] SHOP [ ]

TYPE _____

LOCATION _____

DIALS _____

HS CPLG ** SHAFT _____ LBS(_____ ")

LS CPLG _____ SHAFT _____ LBS(_____ ")

TEST DYNO 200

TEST LOAD NONE

** SEE SKETCH

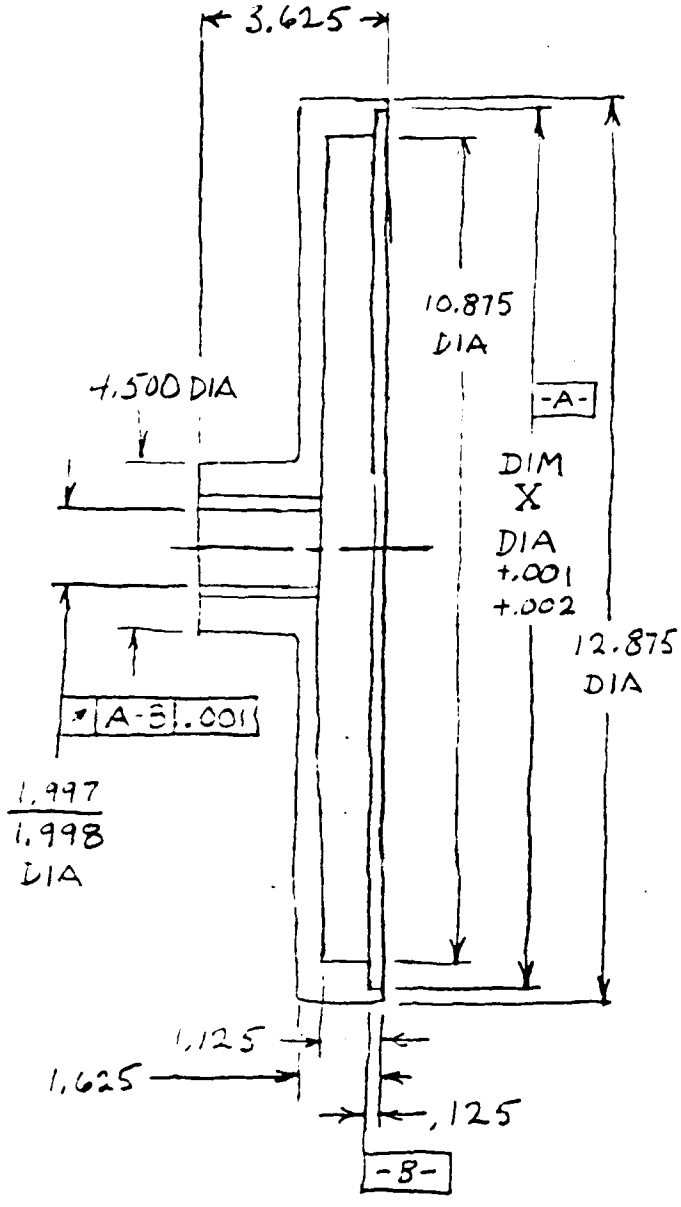
* CW LOOKING AT INPUT
REF DWG 1108293.
CONNECT LUBE SYSTEM PER ATTACHED SKETCH

TAPE BARE THERMOCOUPLES TO ALL ACCESSABLE BEARING CAPS

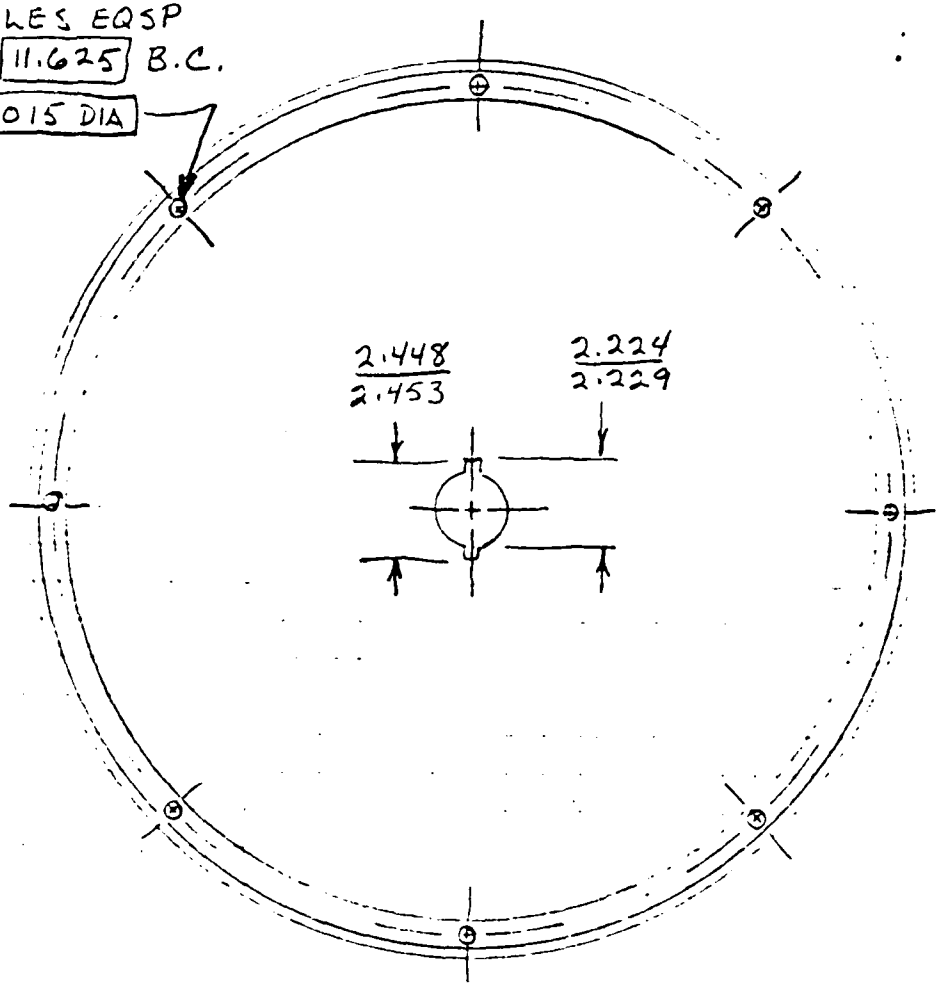
WESTECH GEAR CORPORATION	SIZE A	CODE IDENT 97578	DRAWING	REV

RH 6-13-85

EXHIBIT I



.375-16 UNC-2B
.75 DEEP
8 HOLES EQSP
ON 11.625 B.C.
⌖ .015 DIA



COMMODITY CODE 06531

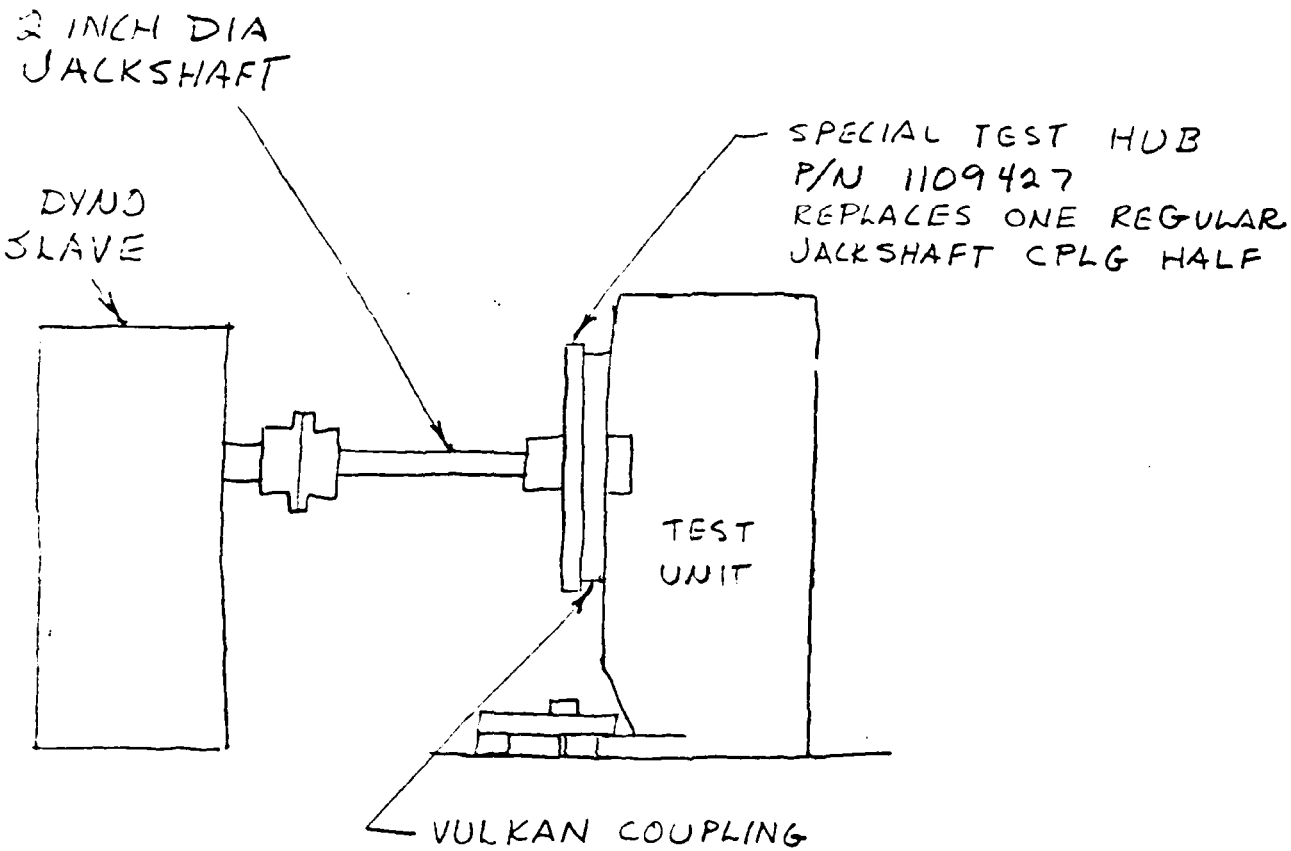
9/0180-7150

MATL = MILD STEEL
BREAK SHARP EDGES
CORNER R = .005 TO .015
DIMENSION X = MEASURED O.D. OF
VULASTIC VP 5520-1730/10" SPL

HUB
1109427

DU 6-11-86

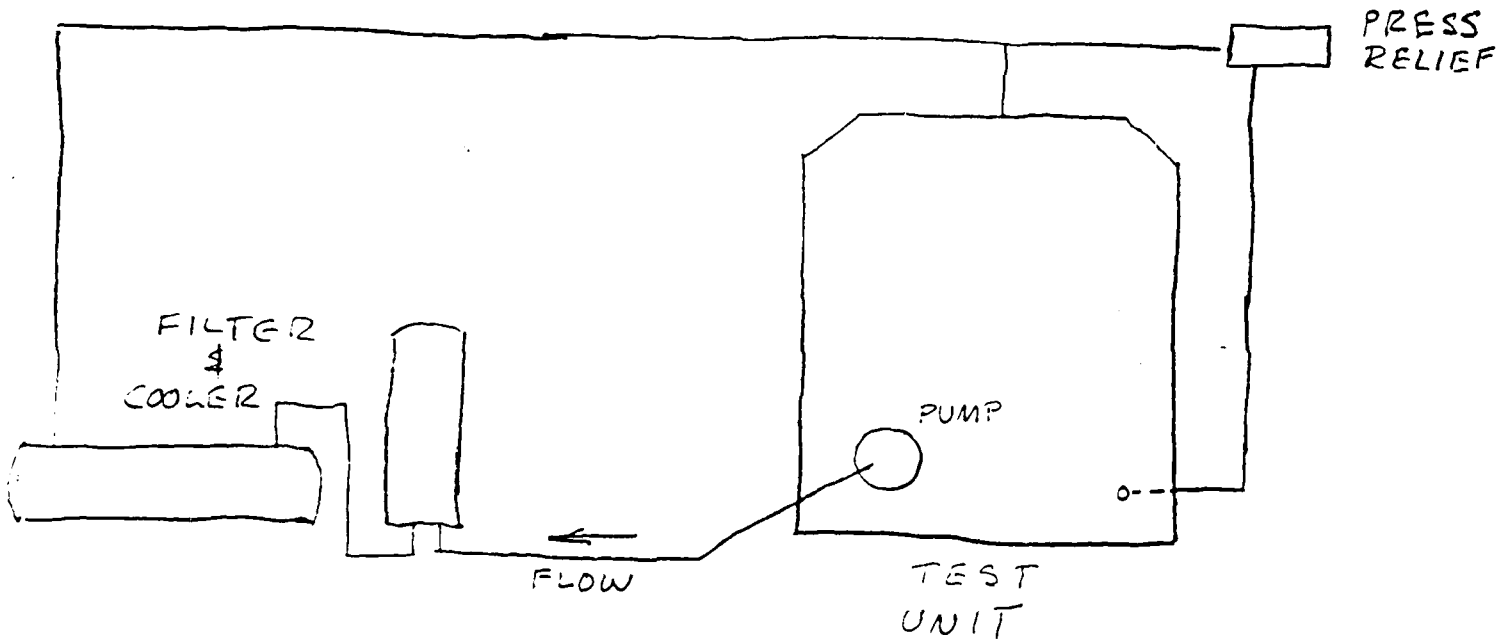
EXHIBIT I



TIE DOWNS SHOWN ON ONE SIDE OF TEST UNIT ONLY
TEST ENGR TO INSPECT BEFORE RUNNING

180-91587

EXHIBIT 1



RETURN HOSE ON BILL OF MATL NOT SHOWN

180-91587

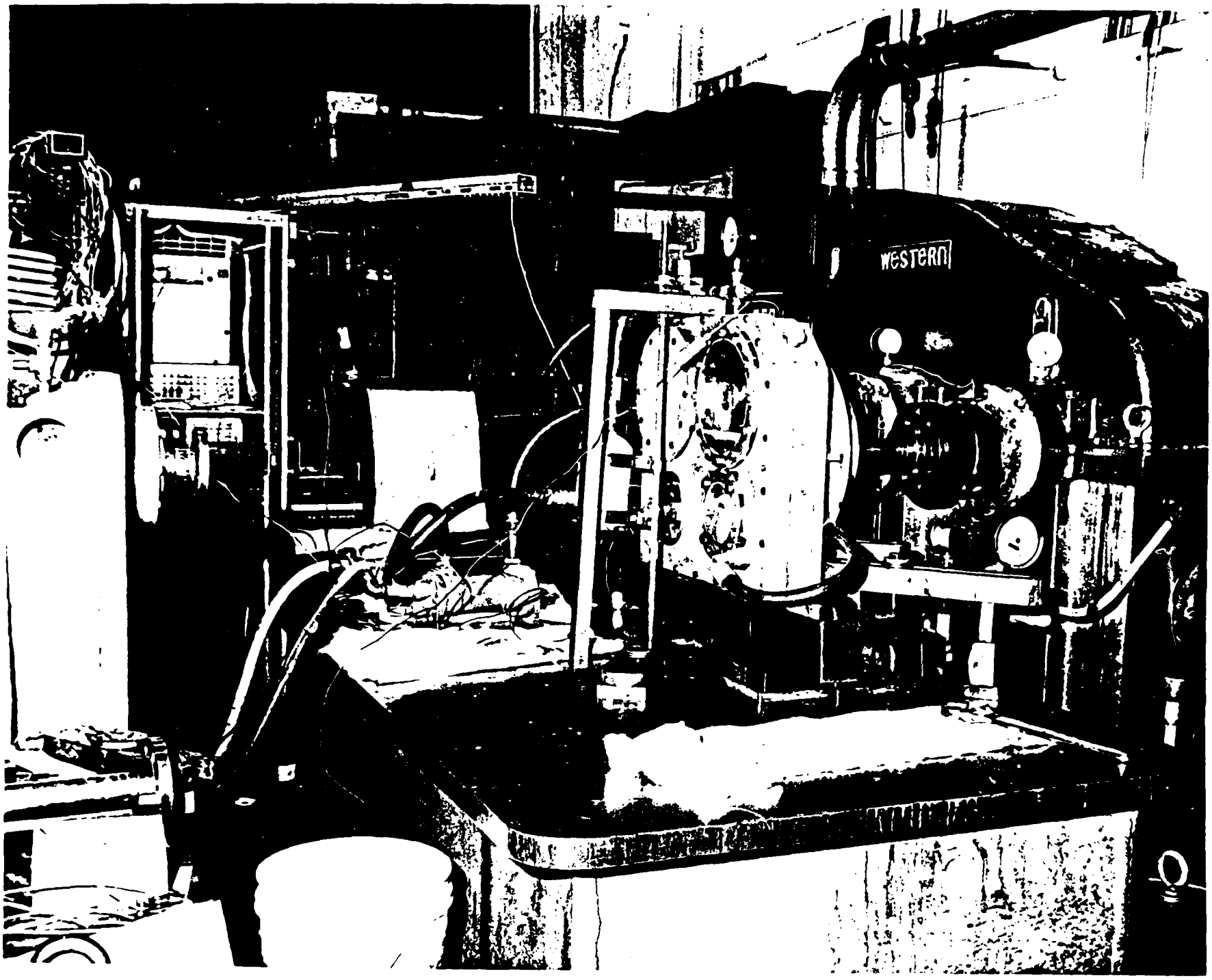
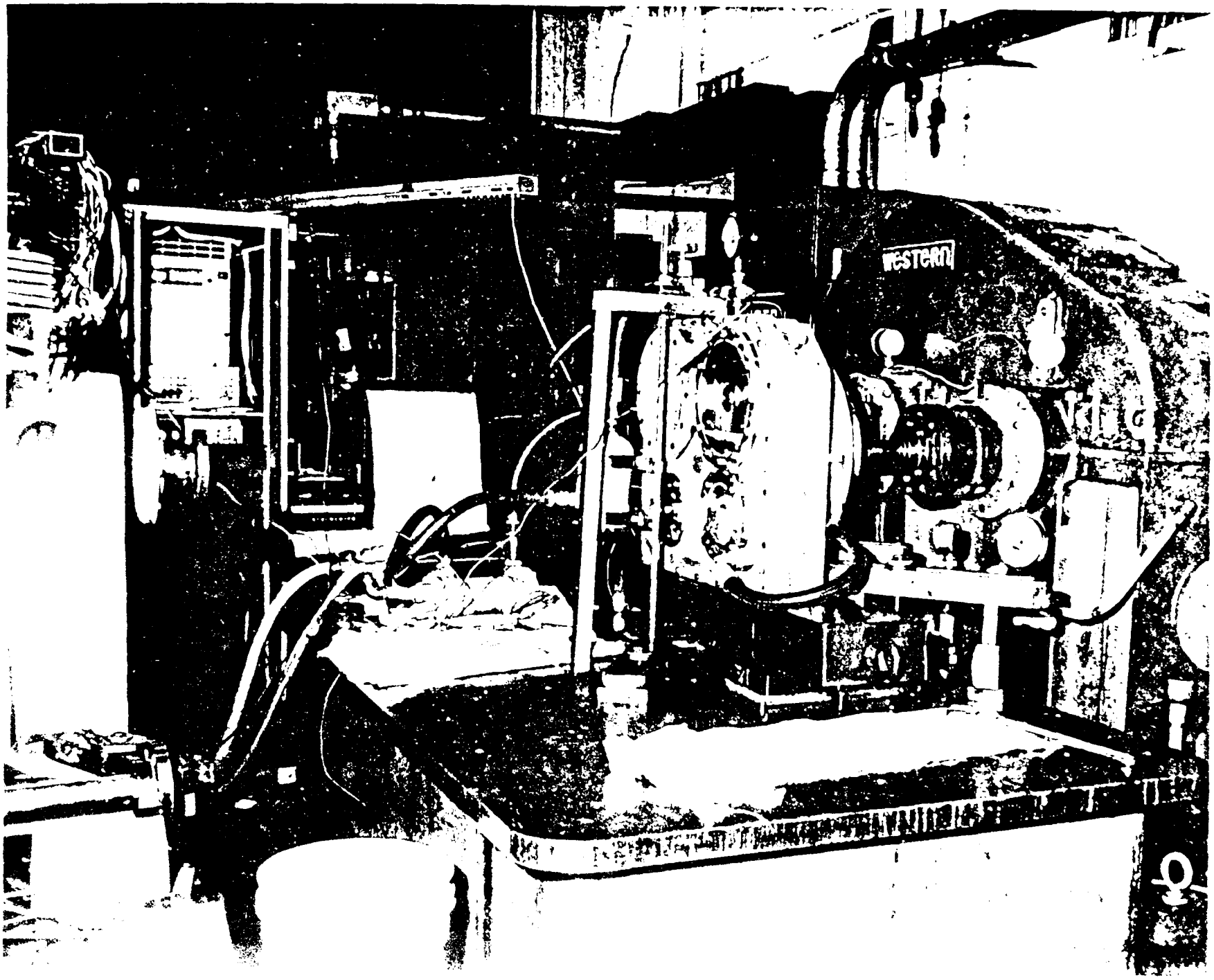
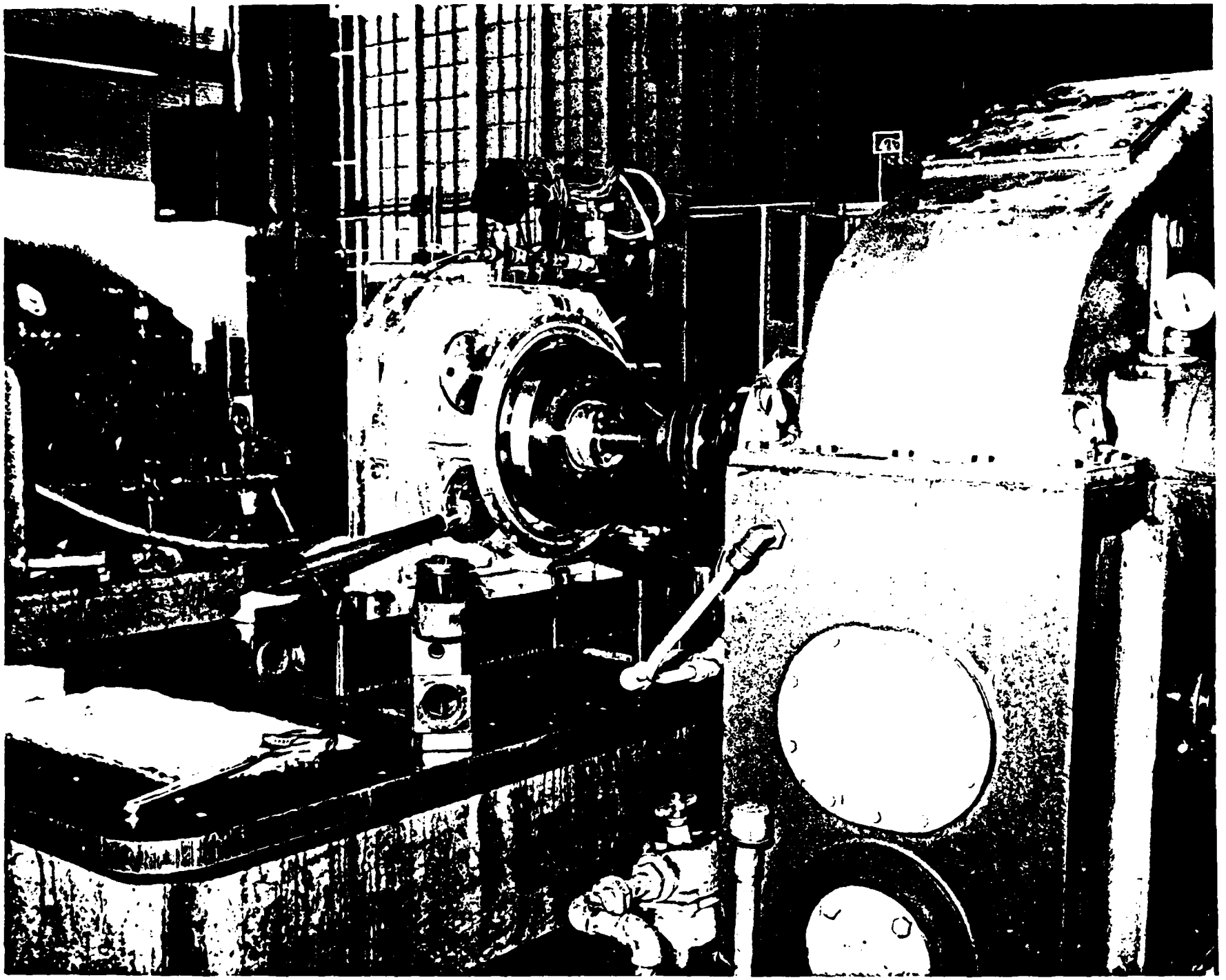


EXHIBIT II


WESTERN



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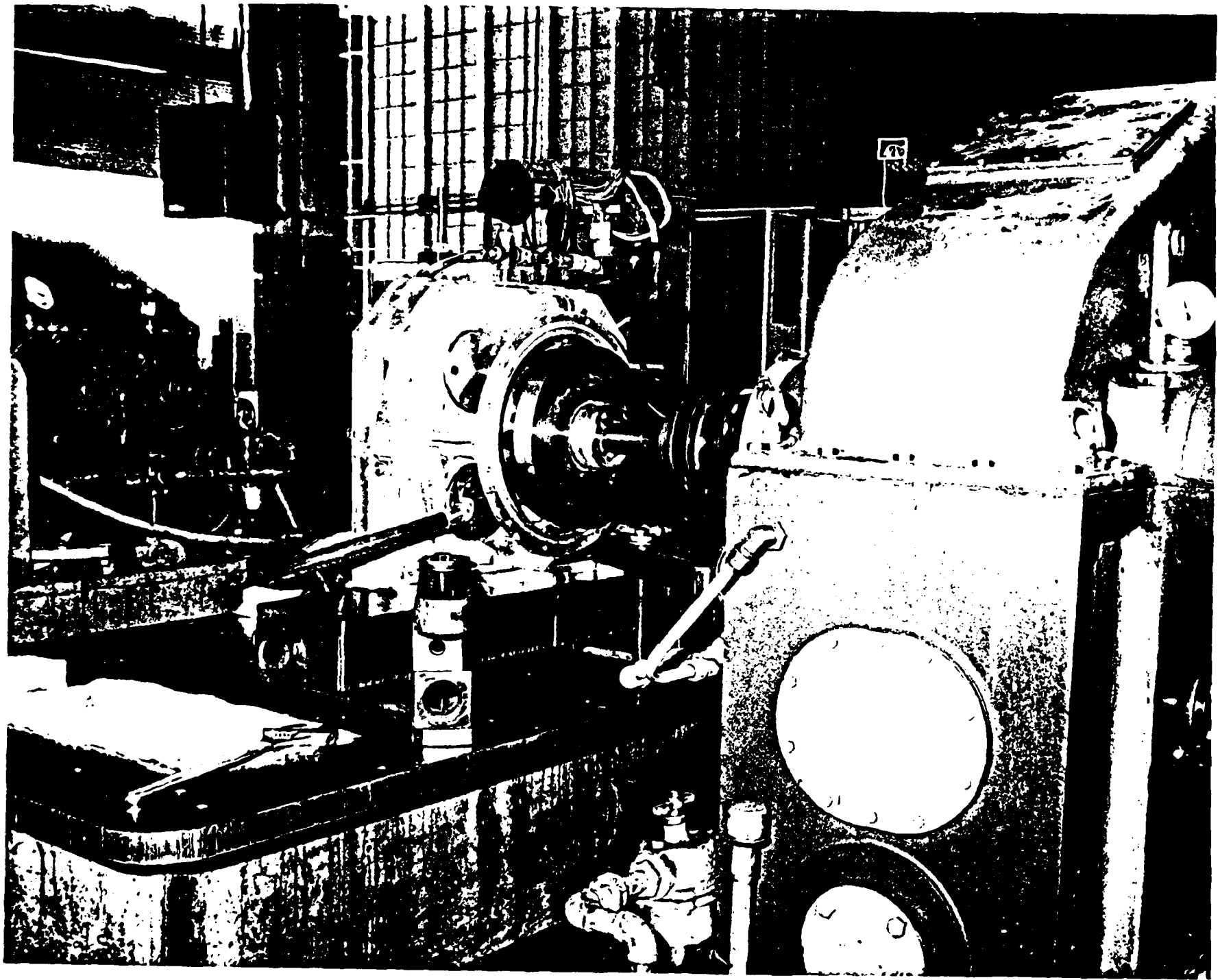

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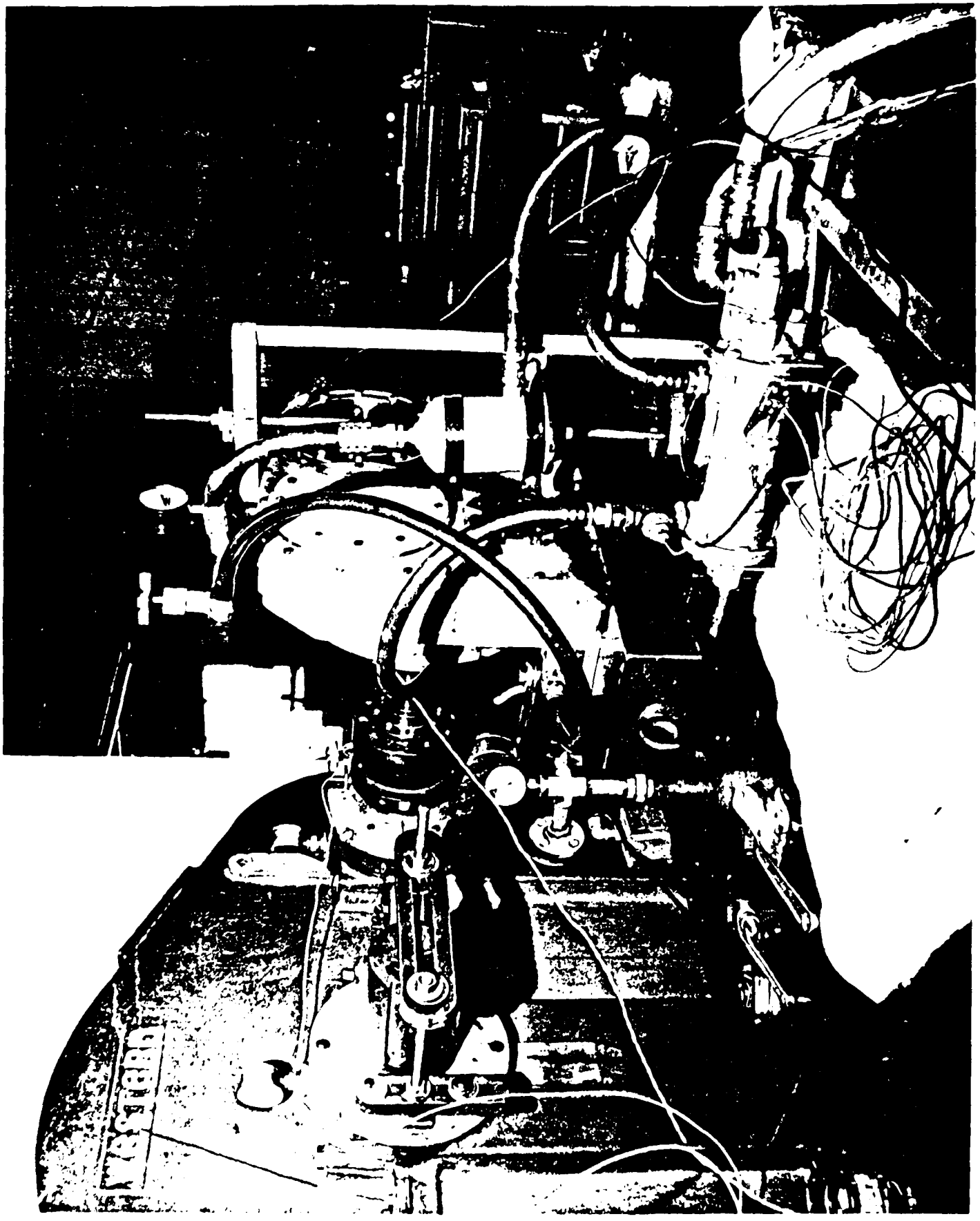

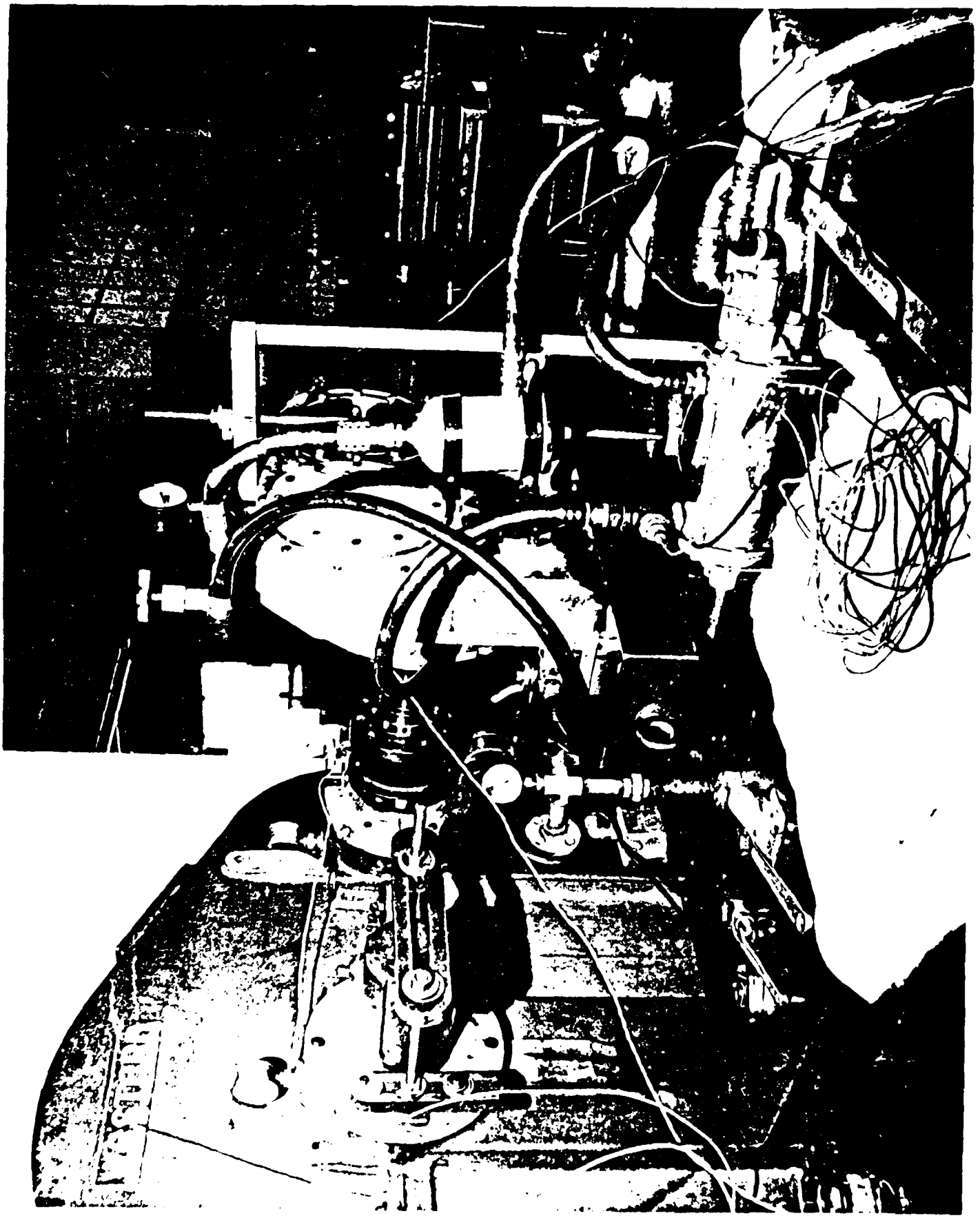

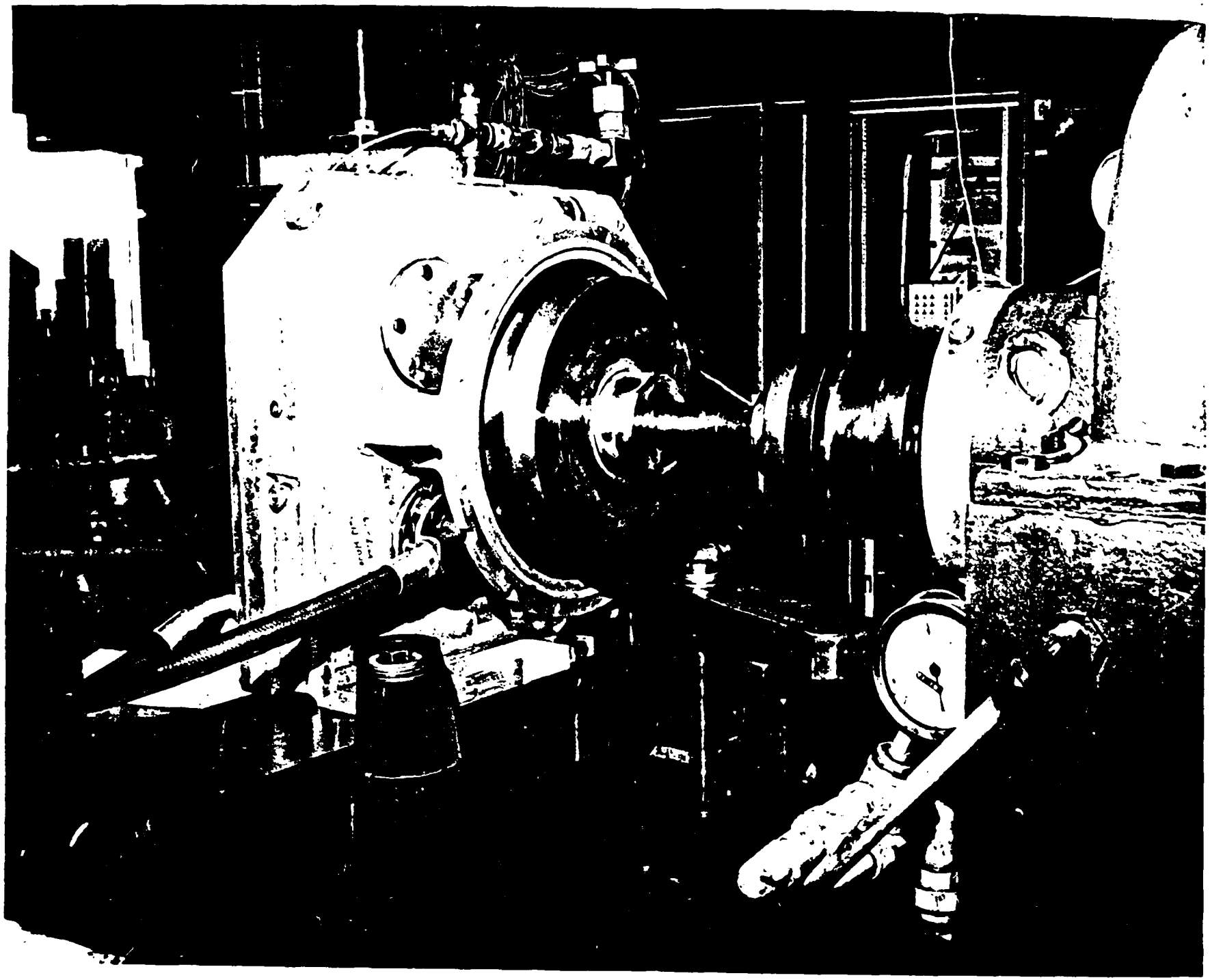

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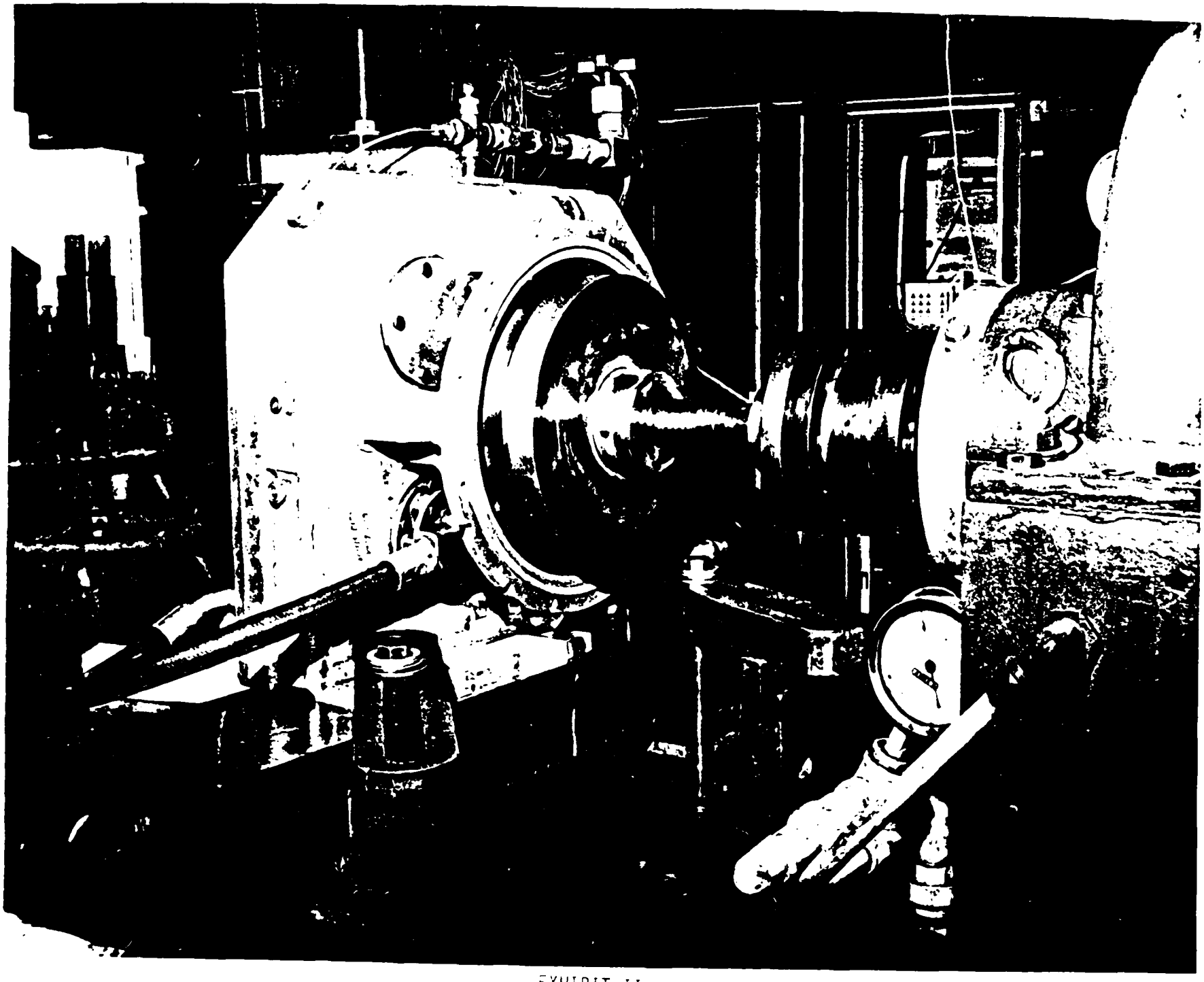
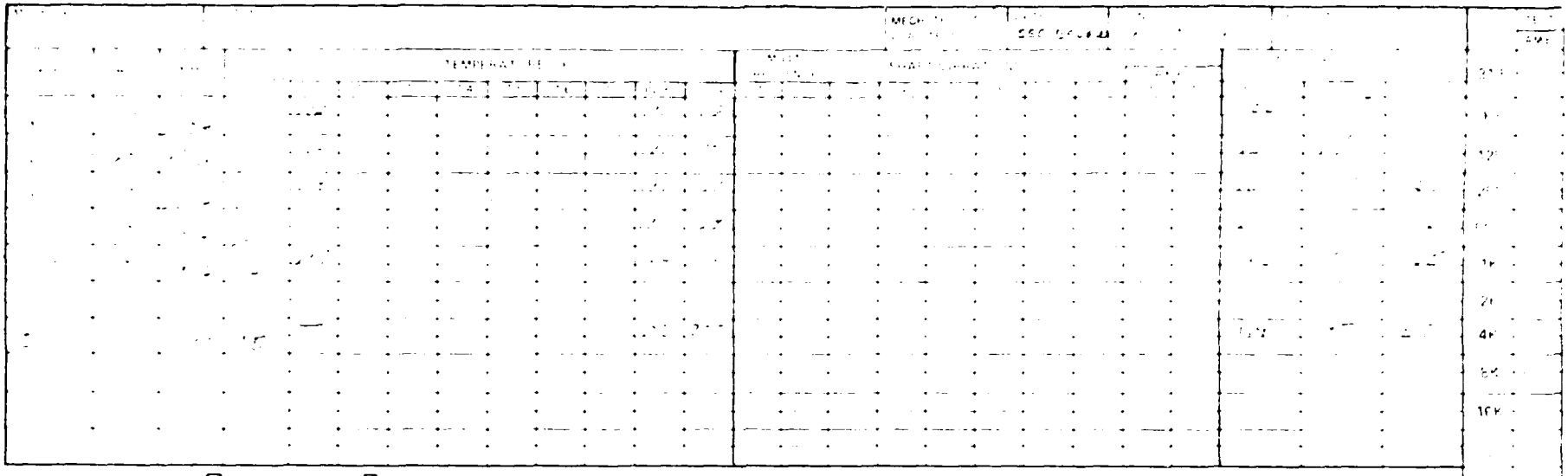
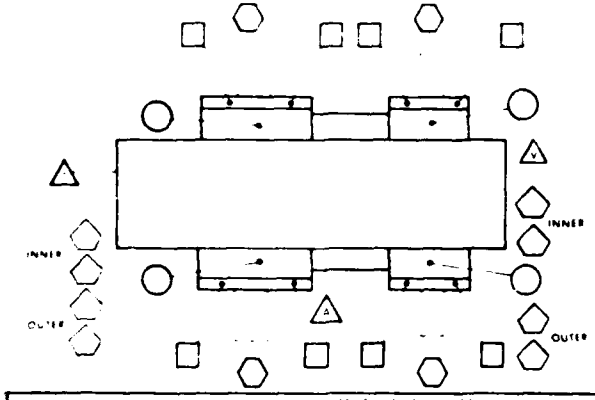


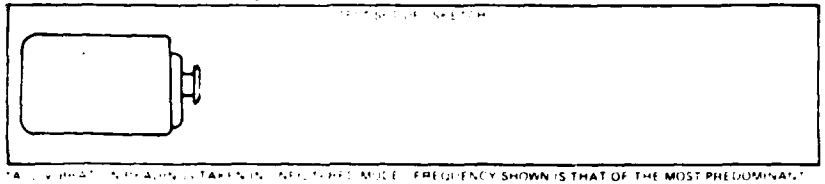
EXHIBIT II

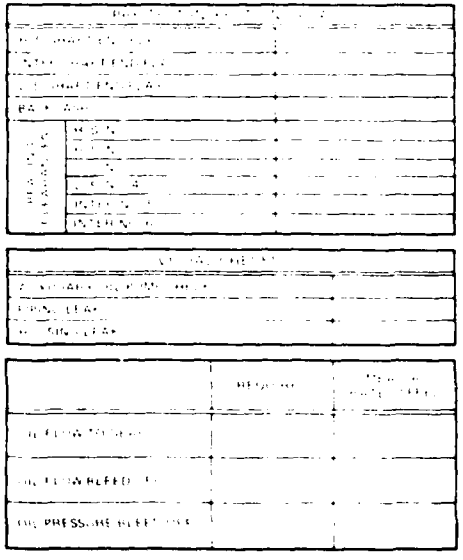
WISTECH

HIGH SPEED
INSPECTION
AND OPERATION
DATA SHEET









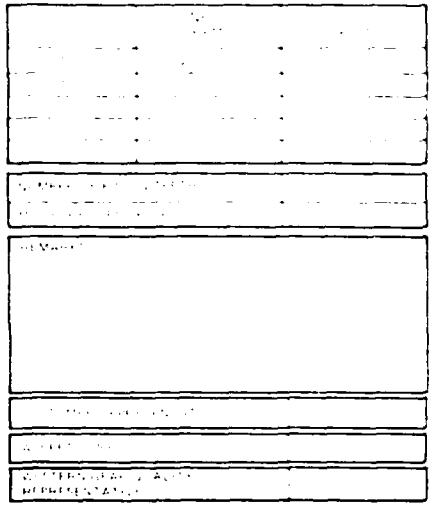


EXHIBIT III

END

Feb.

1988

DTIC